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ABSTRACT

Linguistic sophistication is the primary requisite for effective initiation of verbal responses to abstract stimuli. Young children find it difficult to initiate responses for unknown symbols and words. The most linguistically sophisticated children in a sample of thirty-six preschoolers were able to make effective responses to abstract stimuli. Linguistic sophistication was measured by standardized vocabulary performance, descriptions of pictures, and communications skills performance. The data analysis, using correlation and multiple regression techniques, showed that high linguistic competence was more important than cognitive style or quantity of utterances in predicting the children who would initiate on abstract ideas. (Author)

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Factors in Predicting Initiation of Verbal Responses on Abstract Stimuli

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Introduction

There has been a great deal of research which suggests that preschool age children are unable to describe abstract pictures and are unable to communicate with peers about these pictures (Dickson, 1974; Krauss & Glucksberg, 1968; Kraus & Weisberg, 1966). Some researchers have explained this phenomenon by citing the works of Piaget on "egocentric" speech. Arguments in this vein posit that understanding between children of seven years of age or younger are nearly non-existent. Piaget (1926) points out that 45 percent of the speech that two 6½ year old boys uttered was egocentric (speech not adapted to a listener). He concluded that understanding between preschoolers occurs "only insofar as there is contact between two identical mental schemes already existing in each child" (1926, p. 120).

Other coefficients of egocentrism have not been so extreme, however, leading us to believe it may be situation specific. Rubin, Hultsch & Peters (1971), for example, calculated coefficients of egocentrism (a ratio of egocentric speech to total utterances) for four year olds in three different situations: children alone, children with other children, and children with minimally responsive adults. Results indicated that the magnitude of the coefficients of egocentrism varied widely across situations, ranging from a high of .88 to a low of .32. Mueller (1972) found that 85% of utterances between 3½ and 5 year old children received replies or at least attracted listeners' attention. This seems to argue against both egocentrism and age (an implicit corollary of egocentrism if one argues that children eventually pass that stage) as the main factors in communication. Shatz & Gelman's work (1973) supports this argument--they found that four year old children were able to adjust the complexity of their language when talking with two year olds.

The quest for an explanation of the process by which children come to deal with abstract stimuli seems in need of serious rethinking. This paper attempts to explore the communication process from a sociological and linguistic perspective. We have expanded the focus on the communication situation from one dealing with characteristics of the child primarily (such as age, egocentrism, or learning style) to one including externally manipulable influces as well (such as television and language ability). We redefined the problem to focus on the process whereby children come to deal with more abstract stimuli in communication. This highlighted an important question with which we wanted to deal: What sorts of stimuli do preschool age children find abstract? The term "abstract"

has been used frequently in the literature but infrequently defined. We use it here to denote ideas which do not have referents in the subject's immediate environment. Following Dickson's definition (1974, p. 1), we have envisioned communication as "the ability of one person to describe a referent (picture, object, color) so that another person can select the target from a group of referents." Definition of the process in these terms highlights two of its aspects: the stimulus and the actors. Research has already shown that these are important. Shatz & Gelman (1972, p. 31) capture the essence of the problem "Evidence that young children have rudimentary communication skills depends upon both the task domain in which a task is set and on the simplicity or naturalness of the task itself." We elaborate on the stimulus and what we call the context below.

Actors or Context. Children's ability to manipulate their level of language to accomodate their companions (be they adults or other children) makes it incumbent upon the investigator to take the context of the communication into consideration. Piaget set the scene in school. We set the scene in the parent-child context. Research has shown that children lift the level of their speech when conversing with adults (Shatz & Gelman, 1973). Thus, it seemed to us that it would be in the parent-child interaction context, if anywhere, that preschool age children would communicate on abstract stimuli.

Stimulus. Investigators have used various techniques to explore the ability of preschool aged children to communicate. Flavell et al. (1968) used arrays of geometric shapes. Garvey (1972) used pictures with different numbers of attributes. Kraus & Glucksberg (1969) found that children differentially discriminate among figures that vary on dimensions of "abstractness." We used a series of figures that vary both in their number of attributes and in their symbolic representations. The outstanding feature of the stimuli (described in more detain in the following section) was a dimension of remoteness from preschool age children's environment.

How do children manipulate their productive language to deal with ideas which are not usually part of their immediate environment (ideas which do not have referents)? In some ways this is the question of how children grapple with creativity and deal with uncertainty or ambiguity--what tools are of use? Are there definite tools children need to communicate effectively (i.e. initiate and make the communication comprehensible to others); or is experience in unencumbered speech--loquaciousness--sufficient? These are the questions we address in this paper. We analyze the communication process, as a process,

in order to determine how children can be enabled to learn to grapple with new and sometimes outlandish ideas.

Specifically, our hypotheses were these:

1. 3½ to 4½ year old children can adequately describe certain "abstract" pictures--those which are symbolic representations of something within their environment.

2. Young children (3½ to 4½ years old) will not be able to describe "abstract" pictures which do not have analogs within their own environment.

3. The child's vocabulary (lexicon) will determine performance on more "abstract" stimuli.

4. Children's cognitive style (as measured by an impulsivity-reflectivity task) will not be associated with performance on more "abstract" stimuli.

5. Involvement with television will be associated with effectiveness of communication.

6. Children experienced in unencumbered speech (i.e. loquacious children) will not initiate more often or more effectively on more "abstract" stimuli.

Methods

Sample. Thirty-six children from 3½ to 4½ years of age were randomly selected from within a sample stratified by ethnicity and S.E.S. from a pool of 171 children whose parents responded to a preschool reading attitudinal survey. Table 1 illustrates the design of the study.

Table 1 about here

Procedures. Each of the thirty-six children was asked to participate in the following tasks.

1. WPPSI Vocabulary Subtest (19). Children were asked to define words on the WPPSI Vocabulary Subtests. The words were presented to the child without context and were scored on the 2 point scale prescribed by WPPSI.

2,3,4. Stanford Foundations Skills Vocabulary Subtests (19). Children were asked to select the visual representation of the target word. Each correct picture had two distractors. This vocabulary task included recognition of nominals (shoe, crayon), verbals (knitting, jumping), and prepositions (through, behind).

5. WPPSI Similarities Subtest (19). Children were asked to explain the relationship between two words, ideas, or concepts (nickel/penny). They were

Table 1

Design of the Sample

	S.E.S.[a]		
Ethnicity	Black Socio-economic Status		
	Low	Med.	High
	3	3	3
Ethnicity	Anglo Socio-economic Status		
	3	3	3
Ethnicity	Latino Socio-economic Status		
	3	3	3
Ethnicity	Chinese Socio-economic Status		
	3	3	3

a) Note that S.E.S. was measured using Holingshed's techniques relatively for each ethnic group. This provided a contextual measure of socioeconomic status.

rated on the 2 point scale prescribed by WPPSI.

6. Tell a story about a picture. Children were asked to "tell the whole story" of a specific picture. The stimulus was a picture of a young girl, about five years of age, kneeling on a drainboard, touching an ornate can which rested on the top shelf of an opened cupboard. Children's stories were tape recorded and coded.

7. Television Recognition. Children were shown promotional pictures of TV characters from twenty different shows and asked to identify the name of the show. These pictures were produced and distributed by television network publicity departments.

8. Impulsivity-Reflectivity Task. Children were asked to draw a line from a picture of a rabbit to the picture of a carrot in six separate conditions: (a) free (wide and narrow roadways); (b) accuracy (wide and narrow roadways); (c) speed (wide and narrow roadways).

9. Reading Episode. Parents were asked to read Ask Mr. Bear (by Marjorie Flack) to their children. No other instructions were given for this task. The entire episode was tape recorded, and tape recordings were examined to determine the number of words the child used during the episode and the number of questions the parent asked.

Researchers have shown certain variables are related to language success. We have chosen examples to demonstrate language ability (tasks 1-5), loquaciousness (derived from the number of words the child uses in task 6), environment (involvement with television--task 7; parent emphasis on inferential thinking--derived from task 9) and learning style (task 8).

Children were also asked, along with their parents, to participate in the Dickson Communication Task. This provided our dependent measure--initiation on progressively abstract stimuli. Parents described a series of target pictures to the child who had to correctly choose one from a set of four pictures. Children, then, had to describe a series of target pictures to their parents, who in turn had to push a button under the appropriate picture. The latter series of pictures is the one we are concerned with here. The buttons were electrically connected to a light under each picture. As the selection was made, the light under the picture chosen would go on immediately, thereby providing participants with instant feedback. The pictures used are presented in Figure 1.

Place Figure 1 about here

Scoring of Pictures. Responses to individual pictures were coded for effectiveness in describing the stimulus and for child initiation of the descriptors. Effectiveness was determined by the number of dimensions in the figure which the child freely mentioned without prompting by the parent. Scores were computed as percentages--proportion of attributes mentioned. (Please see Appendix 1 for examples of codings of initiation and effectiveness.) Initiation was determined by a measurement of child predominance in the descriptive episode and by origination of the description. A dual value system was used in coding child predominance and a tri-value system for origination (i.e. 0= child does not initiation; 1= child originates after some prodding by parent; 2= child originates the description--Please see Appendix 1 for examples of the codings).

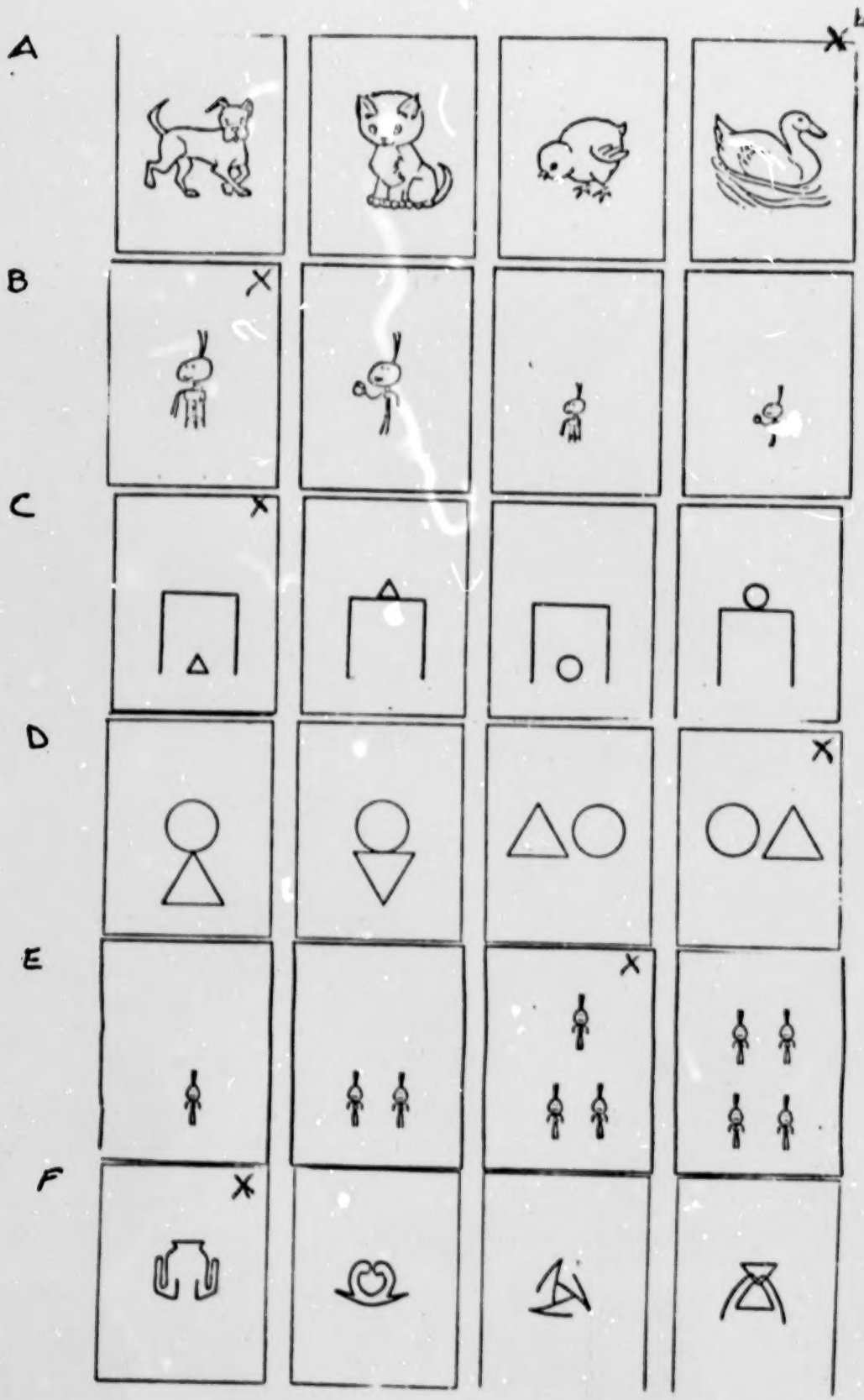
Group Categorization of Pictures. The eight pictures were grouped into five categories which varied along a dimension of abstractness. Again, abstractness was defined for our purposes to be a composite of the number of attributes in the picture and whether the symbolic representation was in the immediate environment for children aged 3½ to 4½. The groups were as follows (a low number refers to a less abstract position along our dimension).

Group	Picture
I	A
II	E,H
III	B,G
IV	C,D
V	F

It is important to mention here that the categorization was accomplished independently of children's responses. Criteria from Kraus & Glucksberg (1969) and Dickson (1974)--both of whom used similar or the same pictures--were applied in the categorization. Children's responses to the pictures (performance) were later compared with our categorization using a factor analysis technique. Results are presented in Appendix II. Summarizing briefly, results parallel the five-fold categorization scheme used in the study except in the instance of one reversal.

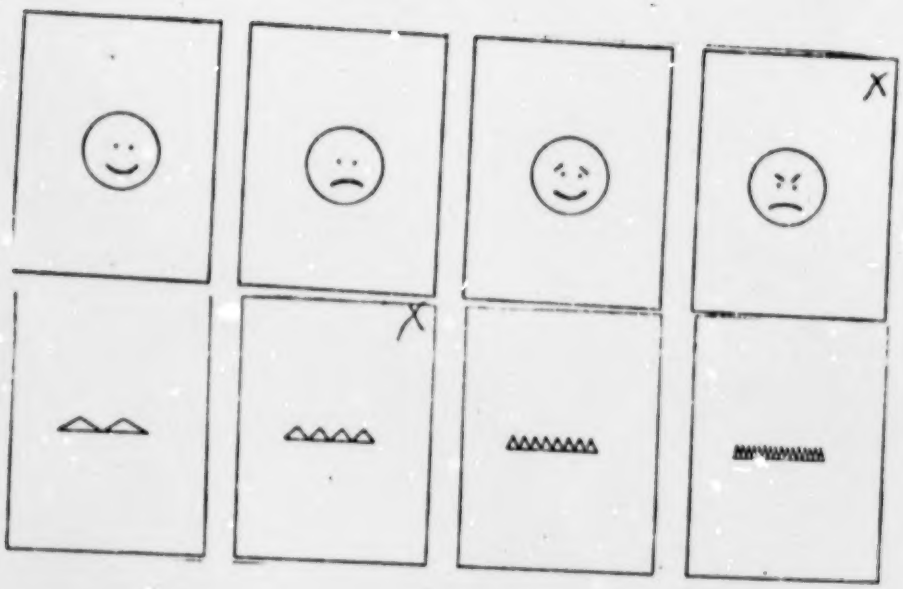
FIGURE 1

EIGHT STIMULI VARYING IN LEVELS OF ABSTRACTION [a]



G.

H



a) REPRINTED from DICKSON, W.P. PICTURE BOOK COMMUNICATION GAME MANUAL. STANFORD, CA.: SCHOOL OF EDUCATION, 1975

b) X INDICATES PICTURE TARGETED FOR DESCRIPTION from the set of 4.

Results

Having classified the stimuli along a dimension of abstractness, the first issue which presented itself was whether the children actually differentiated among them in their response initiation. As Table 2 indicates, they did. From the marginals we were able to determine percentages for children initiating without prodding, those initiating with prodding, and those not initiating on a given stimulus. Table 2 presents only those scores for children initiating without prodding.

Place Table 2 about here

Our main hypotheses, however, concern the variables which predict these differential responses. This study includes four classes of variables: background factors (such as age, sex, s.e.s., and a measure of learning style--impulsivity); environmental factors (television involvement and parent-child interaction regarding inferential thinking in a reading task); language frequency; and language ability. Table 3 presents the correlations among these variables. One can see that within groups of variables there are high correlations, especially in the case of the language measures, but the correlations between groups of variables are not generally significant.

Place Table 3 about here

The next set of tables examine the relationship between each of the four groups of variables and both the likelihood of initiating and the effectiveness of the initiation on stimuli varying in levels of abstractness. Table 4 presents the relationships between the background variables and our dependent variables. Socio-economic status is the strongest of the variables in this group, we note. Interestingly, it is slightly more highly related to those pictures higher in abstraction than to those lower in abstraction. This could be an artifact of the preponderance of children who initiated on the less abstract items, however.

Place Table 4 about here

A great deal of research has been done on the effects of these contextual variables. Thus the lack of overwhelming relationships between age, learning style or sex and the probability of initiation, or its effectiveness, was surprising to us. One cannot say that either age, sex,

Table 2

Children's Differential Responses among 8 Stimuli
Varying in level of Abstraction

Picture Stimulus	Apriori Abstraction Rank	Proportion of children Initiating (n=33)
Duck	1	76%
3 ants	2	55%
4 triangles	3	37%
Little ant on a stool	4	61%
Face frowning with eyebrows	5	52%
	6	46%
	7	46%
	8	28%

Table 3

Correlations Within and Between Background, Environment, Language Frequency and Language Ability Variables

(n=33)

	Background Variables				Environment Variables			Frequency Language	Language Ability Variables				
	s.e.s. 1	Age 2	Sex[a] 3	Impulsivity (Learning style) 4	Involvement in Edu Tv. 5	Involvement in Adult Tv 6	Parent-child Reading Interac. 7	Lang Frequency 8	WPPSI 9	Nominals 10	Verbals 11	Similarities 12	Prepositions 13
1)		.21	.15	.01	.62***	∓08	.43*	.23	.27	.30*	.24	.29	.46**
2)			.25	.25	.06	.23	.08	-.30*	.11	.00	.12	∓02	.28
3)				.22	.18	∓09	∓02	∓09	∓19	.12	.28	∓12	∓28
4)					.04	∓07	.06	∓04	.06	∓09	∓28	∓12	∓44**
5)						.31	.52***	∓08	.65***	.48***	.47***	.50***	.49***
6)							.10	∓05	.49***	.39*	.28	.27	.24
7)								.04	.14	.21	.21	.06	.21
8)									∓15	.04	.00	.00	.00
9)										.49***	.39*	.65***	.52***
10)											.55***	.55***	.32*
11)												.30*	.44**
12)													.39*

[a]Female is scored as higher

*p .05
**p .01
***p .005

Table 4

Relationship between Background Variables and Probability of Initiating Effectively on Stimuli Differing on a Dimension of Abstractnesss
(n=33)

	Levels of Abstraction									
	Level 1		Level 2		Level 3		Level 4		Level 5	
	Effec tive- ness	Ini Initi- ation	Effec tive- ness	Initi ation	Effec tive- ness	Ini- tia- tion	Effec tive- ness	Ini- tia- tion	Effec- tive- ness	Ini- tia- tion
SES	.25	.18	.17	.39	.44**	.38*	,38*	.43**	.27	.24
AGE	.03	.22	.04	.17	.00	.13	.03	.16	-.27	-.06
SEX	.18	.42**	.15	.16	.10	.22	.05	-.17	.06	.19
Learning Style--Impul sivity high	-.18	.16	.34*	.00	.17	.20	.14	.05	-.06	.02

*p .05
**p .01

or learning style is unequivocally important in handling abstract stimuli. Socio-economic status, however, does seem to be at least moderately important.

In Table 5 we explore the effects of environmental variables on children's probability of initiating. There has been a great deal of research on the effect of mass media on the learning process (Strickland, 1974; British Report, 1975). Our results seem to support these researchers--recognition of Educational television programs appears to be related to initiation. Contrary to the criticism that television educates children at predominantly concrete thought levels (i.e. less abstract) recognition of television characters seemed to relate euqally well to more abstract and less abstract stimuli. Surprisingly, and reflecting our hypothesis, effectiveness does not seem related to either adult or educational television involvement (recognition).

Place Table 5 about here

A second means whereby media can help young children to grapple with abstract ideas is in the parent-child reading situation. Table 5 includes a measure of the interaction encompassed in such a reading episode. The results are consistent with those for television. (It is important to note here that there were few situations where there was a great deal of interaction between parent and child during the episode, however.)

We have one measure of the child's unencumbered experience with speech--the number of words a child used when asked to describe a picture. It was posited that the experience of initiating speech would tend to transfer to other tasks. Table 6, however, shows that measures of vocabulary--nominals, verbals, similarities, and especially prepositions--related much more highly to initiation and effectiveness on this task than unencumbered speech in the picture description episode.

Place Table 6 about here

In fact, language ability seems to be more powerful than any of the demographic, environmental and language frequency variables in the study. Tables 7 and 8 present a regression in which were entered all four groups of variables against the dependent variables of probability of initiation and effectiveness of initiation, respectively. (Only the variables that

Table 5

Relationship between Environmental Variables and Probability of Initiating Effectively on Stimuli Differing on a Dimension of Abstractness

(n=33)

	Levels of Abstraction									
	Level 1		Level 2		Level 3		Level 4		Level 5	
	Effec-tive-ness	Ini-tia-tion	Effec-tive-ness	Ini-tia-tion	Effec-tive-ness	Ini tia-tion	Effec-tive-ness	Ini-tia-tion	Effec-tive-ness	Ini-tia-tion
Educational Television	.21	.09	.27	.49***	.29	.25	.27	.49***	.12	.06
Adult Television	.30*	.27	.20	.30*	.15	.30*	.07	.31*	.24	.17
Number of words child uses during reading episode	.15	.16	.10	.37*	.05	.07	.25	.30	.03	.05
Number of questions parent asks during reading episode	.10	.21	.15	.27	.23	.20	.20	.20	-05	.02

*p .05

***p .005

Table 6

Relationship between Language Ability and Language Frequency Variables and Probability of Initiating Effectively on Stimuli Differing on a Dimension of Abstractness

(n=33)

	Levels of Abstraction									
	Level 1		Level 2		Level 3		Level44		Level 5	
	Effec tive- ness	Ini- tia- tion	Effec tive- ness	Ini- tia- tion	Effec tive- ness	Ini- tia- tion	Effec tive- ness	Ini- tia- tion	Effec tive- ness	Ini- tia- tion
LANG ABILITY										
WPPSI VOCAB	.29	.28	.47***	.50***	.45***	.53***	.32*	.58***	.11	.17
Nominals	.35 *	.18	.50***	.61***	.27	.37*	.35 *	.47***	104	.09
Verbals	.03	÷10	.33*	.41**	.41**	.39*	.26	.33*	÷05	÷01
WPPSI Similarities	.02	.13	.41**	.45***	.37*	.47***	.43**	.46***	.14	.25
Prepositions	.25	.27	.40**	.43**	.44**	.37*	.42**	.46***	.17	.26
Language Frequency	.07	.08	-06	.10	÷09	.10	÷02	.13	.05	÷04

*p .05
**p .01
***p .005

proved significant are included in the tables.) Results show ses, age, and sex as only moderately significant ($.01 < p < .05$), as we previously stated. WPPSI and other measures of language ability seem to be most effective in predicting initiation and effectiveness on abstract stimuli. Only at level IV is the child's loquaciousness significant; but even there it is less significant than WPPSI. On the only acutely abstract stimulus (V), none of the variables is significantly able to predict either initiation or effectiveness. Knowledge of prepositions, however, comes the closest. Table 8 demonstrates approximately the same relationships hold true for effectiveness as for initiation.

Place Table 7 here

Place Table 8 here

Discussion

As we predicted, children discriminated among the stimuli. Contrary to Piaget and others, children do seem to be able to communicate about certain abstract stimuli (Hypothesis 1). However, as seen in Table 2, fewer children initiated task related remarks about the stimulus at level V. This tends to confirm our second hypothesis. Even loquaciousness--the tendency to initiate in general--did not seem to predict initiation when there was no referent in the child's immediate environment; while it did predict initiation on abstract stimuli which had such referents. It is important to note that what we mean by task related remarks is a remark that communicates some content of the picture. Loquacious children did talk, even at level V, but the remarks tended to be of the variety: "This one; this one; this one" or "I don't know". Level V was a problem for all the children. As one put it, "I don't know what this is. Push whatever you want to." None of our variables were able to predict either initiation or effectiveness at this level, although prepositions came closest (Hypothesis 3, and Table 6).

Learning style, as we predicted in Hypothesis 4, was an effective predictor of initiation only for the less abstract stimuli. Television, although correlated with effectiveness of initiation, was not a good predictor of it, or of probability of initiation (contrary to our prediction in Hypothesis 5).

Table 7

Regression Indicating Significant Background, Environment, Language Frequency and Language Ability Variables against Initiation on Progressively Abstract Stimuli (n=31)

Initiation on:	Level of Abstraction	Independent Variable	r^2	F
	I	a) Sex	.42	6.52*
		b) S.e.s.	.49	4.57*
		c) Impulsivity	.32	3.35*
		d) WPPSI	.41	2.98*
		e) Verbals	.53	3.62
		f) No. of questions parent asked	.58	3.41*
		g) Adult television character recognition	.64	3.59*
	II	a) Age	.47	4.13*
		b) S.e.s.	.39	5.33*
		c) Impulsivity	.79	8.72**
		d) Nominals	.61	17.69**
		e) Prepositions	.66	11.14**
		f) No. of questions	.75	8.92**
	III	a) Sex	.49	4.46*
		b) S.e.s.	.39	5.03*
		c) WPPSI	.53	11.80**
	IV	a) Sex	.54	3.85*
		b) S.e.s.	.44	7.13*
		c) Age	.51	5.07*
		d) WPPSI	.58	15.05**
		e) No. of words child says during Reading episode	.62	8.98**
	V	Preposition knowledge	.26	2.13

* p .05
** p .01

Table 8

Regression Indicating Significant Background, Environment, Language Frequency and Language Ability Variables Against Effectiveness of Initiation on Progressively Abstract Stimuli

(n=31)

Initiation on: Level of Abstraction	Independent Variable	r	F
I	a) Impulsivity	.47	2.66*
	b) Nominals	.35	4.09*
II	a) Impulsivity	.62	5.89**
	b) Nominals	.50	10.23**
	c) WPPSI	.57	6.92**
III	a) S.e.s.	.44	7.03**
	b) WPPSI	.45	7.74**
IV	a) S.e.s.	.38	5.11*
	b) WPPSI	.44	6.99**
	c) Prepositions	.51	5.11
V	nothing		

* p .05
**p .01

There are a few surprising findings which were not predicted, but which might be illuminating. Already mentioned was the surprising lack of effect of the background variables of age, ses, and sex. Our measure of parent-child interaction on the reading task was another. We were startled to find so few parents who performed any sort of questioning, clarifying or elaboration on the content they read to their children. This in spite of the fact they were aware they were being tape recorded. This could portend a possibly diminished training in inferential thinking and extrapolating which, in turn, could be used to explain the ineffectiveness of television, learning style, and parent-child interaction. Perhaps the added dimension of explicit training is necessary in using these factors as assets in grappling with new ideas.

What is the meaning of all this? As stated at the outset of this paper, initiation on tasks which do not have referents may be fundamental to creative thinking. It has previously been hypothesized that such initiation was a matter of boldness--help the less precocious child to become emboldened was the prescription. Self-image, reflectivity, individualized learning channels--each of these has been focused upon as a means of boosting children's creativity. While not denying the merit of these endeavors, we have focused upon the linguistic elements in the abstract task. Prepositions and other linguistic elements in the thought process indicative of a knowledge of relationships seem to be important for initiating on acutely abstract pictures, while knowledge of nominals, verbals and other "content words" relate less well. Experience in speech seems more important when the abstract stimuli are more clearly related to the child's environment--such as the "mad face" and the symbolic representation many children referred to as a door or store.

We tested children in the sample on knowlege of "between, into, up. out, of, behind, inside, over and through" using the Stanford Skills Subtests. While knowledge of these prepositions was not associated with the probability of initiation at level V, at least three (into, inside, and up) correlate .45**, .31*, and .30*, respectively, with initiation at level IV. This is not surprising when one reflects on the content of the pictures. Training in making relationships may be important. These tests, however, only reflect the child's receptive language. It could be the case that stress on relational concepts nees to be combined with training in inferential thinking to be productive.

In Summary, preschool age children can communicate about abstract referents. Our findings indicate that the context of the communication and the content of the stimulus are important factors in the process. Moreover, we suggest, on the basis of what really must be considered an exploratory study because of the small sample and the small number of abstract pictures used, that researchers might profitably focus on linguistic elements that provide the sophistication necessary for dealing with ideas which do not have referents; and relational concepts might be a good place to begin.

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Appendix 1

Examples of Codings of Initiation,
Predominance & Effectiveness

Initiation

3=without prodding

Stimulus		transcribed interaction (c=child; m=mother)
	(1)	c: A little triangle m: is the triangle sitting on the floor or the ceiling? c: floor
	(2)	c: I see a rectangle on the bottom of a square
	(3)	c: The ant sitting on a stool m: The big ant or the little one? c: little
	(4)	c: I see an ant sitting on a stool

2=with prodding

Stimulus		transcribed interaction (c=child; m=mother)
	(1)	c: Ma, do this one. m: Tell me which one c: Someone sitting on a chair
	(2)	m: What's it look like? c: A girl m: A girl? c: No, a triangle

Predominance

1= child predominant

Stimulus		transcribed interaction (c=child; m=mother)
	(1)	c: I see a rectangle on the bottom of a square m: A rectangle? c: A triangle m: Good
	(2)	c: How about the triangle that's down?
	(1)	c: I see an ant sitting on a stool

0= Parent predominant

Stimulus		transcribed interaction (c=child; m=mother)
	(1)	m: What's it look like? c: A stool m: That one? m: This one?
	(1)	c: Now push this one m: Which one? c: This one m: You have to explain

c: This one
m: Is it a picture of a ball?
c: No
m: A triangle?
c: Yeah
m: On top or under?
c: Top

Effectiveness (Percentage

100%

Stimulus	Transcribed interaction (c-child; m=mother)
	(1) c: How about the triangle that's down
50%	(1) c: How about the one sitting in the chair (doesn't get size)

Appendix II

Factor Analysis of Children's Responses to Stimuli

Differing in Level of Abstraction

(n=36)

Factor I 17.23% variance explained			Factor II 18.74% variance explained			Factor III 26.07% variance explained		
Our Categorization[a]	Fig[b]	Factor coefficient	Our Categorization	Fig	Factor coefficient	Our Categorization	Fig	Factor coefficient
I	Duck	.64	II		.71	III	face	.79
II	3 ants	.86	III		.86	IV		.82
						IV		.54
						V		.45

[a] See page 5 of the text

[b] Pictures are presented in Figure 1, about page 5 in the text